Amendment Under 37 CFR 1.116
Dated December 8, 2003
Serial No. 09/231,271

IN THE SPECIFICATION

Please replace the second paragraph on page 6 with the following amended paragraph:

C1

FIG. 3 is a circuit diagram schematically illustrating the current and voltage ~~sense~~ sensing circuits, and the controller of Fig. 1 in greater detail;

Please replace the paragraph beginning on page 6, line 17 with the following amended paragraph:

Referring to FIG. 1, a line circuit and protection arrangement is illustrated coupled to a two-wire telephone subscriber line 10 comprising tip and ring wires on sides T and R of the line 10, respectively. An isolation relay 12 is coupled in series with the tip and ring wires and provides a normally closed double pole switch 11 in series with each of the T and R sides of the line 10. A battery feed resistor 13 is connected in series between the isolation relay 12 and the remainder of the line circuit on each of the T and R sides of the line 10. A current sensing circuit 14 is coupled to the battery feed resistors 13. The isolation relay 12 is for disconnecting the line

C2

circuit from the subscriber line 10. This may be done for protecting the line circuit from an over-voltage condition that exists on the line 10, or for testing purposes. In addition, in accordance with this invention the isolation relay 12 is controlled by a controller 16 in dependence upon tip and ring voltages, $V_{TIP}$ and $V_{RING}$, at the T and R sides of the line 10, respectively. The tip and ring voltages, $V_{TIP}$ and $V_{RING}$, are sensed by a voltage sensing circuit 18 connected to the T and R sides of the line 10 between the isolation relay 12 and the battery feed resistors 13. A battery 22 provides power to the subscriber line 10 through a battery isolation circuit 20 and the remainder of the line circuit 24. The controller 16 has inputs connected to the voltage sensing circuit 18, the current sensing circuit 14, and an input connected to the remainder of ~~the~~ line

circuit 24 for normal isolation control used for testing purposes. An output of the controller 16 is connected to the isolation relay 12 for controlling opening and closing of the switch 11 of the isolation relay 12. Another output of controller 16 is connected to the battery isolation circuit 20 for controlling connection of the battery 22 to the R side of the subscriber line 10.

C2 Cont

---

Please replace the paragraph beginning on page 7 line 14 with the following amended paragraph:

---

Referring to FIG. 2, in which the battery isolation circuit 20 and some aspects of the remainder of ~~the~~ line circuit 24 are shown in greater detail, the structure and operation of the battery isolation circuit will be described. The battery isolation circuit 20 includes an N-channel enhancement FET 34 and an interface circuit 35 that is indicated by a dashed box. The remainder of ~~the~~ line circuit 24 includes a transformer 26 having a split secondary winding 28. Opposite halves 30 and 32 of the secondary winding are connected in series with the battery feed resistors 13 on the T and R sides of the line 10, respectively. The winding 30 is connected in series with the battery feed resistor 13 on the T side of the line 10 and ground. The winding 32 is connected in series with the battery feed resistor 13 on the R side of the line 10 and the drain of the FET 34. The source of the FET 34 is connected to the negative terminal of the battery 22, typically of 52 volts. The positive terminal of the battery is connected to battery return ground.

C3

---

Please replace the paragraph beginning on page 9 line 10 with the following amended paragraph:

---

Referring to FIG. 3, in which the structure of the current and voltage sensing circuits and the controller block is shown in greater detail, the structure and operation of these blocks will

C4

now be described. The current sensing circuit 14 includes cross-coupled potential dividers formed by resistors 15 coupled to closely matched feed resistors 13. Operational amplifier 17, resistors 19a and 19b, and resistors 21a and 21b form a differential amplifier circuit, which has an output line 23 having a voltage that is representative of the current through the feed resistors 13. The resistors 19a and 19b have a common node connected to ground and each have their other node connected to the midpoint of a respective voltage divider formed by the resistors 15. The resistor 21a is connected across the output of the operational amplifier 17 and its inverting input. The resistor 21b is connected across the non-inverting input of the operational amplifier 17 and ground. Typical values of the resistors 13, 15, 19, and 21 are 165 ohms, 200 kilohms, 15 kilohms, and 13.33 kilohms, respectively.

C4 cont